

IN THE CLAIMS

Please cancel claims 1-4, 6-9, 12, 14-16, 18 and 29-39.

Please amend the claims as follows.

1-4) Cancelled

- 1 5) (Currently amended) ~~The apparatus of claim 4~~ An apparatus comprising:
2 at least one processor;
3 a memory coupled to the at least one processor;
4 a database optimizer residing in the memory and executed by the at least one
5 processor, the database optimizer using statistics regarding the type of applications
6 accessing data in a database, the frequency with which the applications access the data,
7 and the location of the data being accessed by the applications to make at least one
8 change to the database schema to optimize the performance of accessing data in the
9 database;
10 wherein the change to the database schema comprises adding a new column of a
11 second data type to the database that contains the same data in an existing column of a
12 first data type in the database; and
13 wherein the database optimizer further comprises a data coherency mechanism for
14 maintaining data coherency between the existing column and the new column.

6-9) (Cancelled)

1 10) (Original) An apparatus comprising:
2 at least one processor;
3 a memory coupled to the at least one processor;
4 a database residing in the memory;
5 a database optimizer residing in the memory and executed by the at least one processor,
6 the database optimizer comprising:
7 a data access mechanism that uses statistics regarding the type of applications
8 accessing data in a database, the frequency with which the applications access the
9 data, and the location of the data being accessed by the applications to make at
10 least one change to the database schema to optimize the performance of accessing
11 data in the database;
12 customization settings that may be set by a human user to determine the function
13 of the database optimizer;
14 a data coherency mechanism that maintains coherency of reflective columns in the
15 database that are created by the data access mechanism and that contain the same
16 data in different data types; and
17 a data type conversion mechanism that converts data in a first data type retrieved
18 from the database to a second data type that is preferred by a requesting
19 application.

1 11) (Original) An apparatus comprising:
2 at least one processor;
3 a memory coupled to the at least one processor;
4 a database residing in the memory;
5 a database optimizer residing in the memory and executed by the at least one
6 processor, the database optimizer comprising:
7 a mechanism that reads statistics regarding the type of applications
8 accessing data in the database, the frequency with which the applications access
9 the data, and the columns being accessed by the applications;
10 if the statistics indicate that a selected type of application has a number of
11 accesses to a selected column of a first data type in the database that exceeds a
12 first threshold level, the database optimizer determines whether the statistics
13 indicate that the selected type of application has a number of accesses to the
14 selected column that exceeds a second threshold level, and if so, the database
15 optimizer changes the data type of the selected column in the database;
16 if the statistics indicate that a selected type of application has a number of
17 accesses to a selected column of a first data type in the database that exceeds a
18 first threshold level, the data optimizer determines whether the statistics indicate
19 that the selected type of application has a number of accesses to the selected
20 column that exceeds a second threshold level, and if not, the data optimizer adds a
21 new column of a second data type to the database that contains the same data in
22 the selected column, the selected column and the new column being defined as
23 reflective columns because they contain the same data in different data types;
24 wherein the data optimizer detects when one of the plurality of
25 applications requests access to data in the selected column, determines the
26 preferred data type for the requesting application, determines if the data in the
27 selected column is of the preferred data type for the requesting application, and if

(claim 11 continued)

28 the data in the selected column is of the preferred data type for the requesting
29 application, returning the data in the selected column to the requesting
30 application;

31 if the data in any column reflective of the selected column is of the
32 preferred data type for the requesting application, the database optimizer returns
33 the data from the reflective column to the requesting application;

34 if the data in the selected column and in all reflective columns, if any, is
35 not of the preferred data type for the requesting application, the database
36 optimizer converts the data to the preferred data type for the requesting
37 application, and returns the converted data to the requesting application.

12-16) (Cancelled)

- 1 17) (Currently amended) ~~The method of claim 16 further comprising the step of~~ A
2 computer-implemented method for optimizing a database comprising the steps of:
3 (1) determining a preferred data type for at least one of a plurality of applications
4 that access the database;
5 (2) dynamically changing a schema for the database to provide the preferred data
6 type when at least one of the plurality of applications requests access to data in the
7 database; and
8 wherein the step of dynamically changing the schema determines what change to
9 make according to:
10 2A) the type of the plurality of applications accessing data in the database;
11 2B) the frequency with which the plurality of applications access the data;
12 and
13 2C) the location of the data being accessed by the plurality of applications;
14 wherein the step of dynamically changing the schema for the database comprises
15 the step of adding a new column of a second data type to the database that contains the
16 same data in an existing column of a first data type in the database; and
17 (3) maintaining data coherency between the existing column and the new column.
- 18) (Cancelled)
- 1 19) (Currently amended) The method of claim [[12]] 17 further comprising the step
2 of gathering the statistics.

1 20) (Currently amended) A computer-implemented method for reading data from a
2 database comprising the steps of:
3 (1) specifying a preferred data type for at least one of a plurality of applications
4 that access the database;
5 (2) detecting when one of the plurality of applications requests access to data in
6 the database;
7 (3) determining the preferred data type for the requesting application;
8 (4) determining if the data is stored in the database in the preferred data type for
9 the requesting application;
10 (5) if the data is stored in the database in the preferred data type for the requesting
11 application, returning the data to the requesting application;
12 (6) if the data is not stored in the database in the preferred data type for the
13 requesting application, performing the steps of:
14 (6A) converting the data to the preferred data type for the requesting
15 application; and
16 (6B) returning the converted data to the requesting application;
17 (7) reading statistics regarding the type of applications accessing data in the
18 database, the frequency with which the applications access the data, and the location of
19 the data being accessed by the applications; and
20 (8) dynamically changing a schema for the database to provide the preferred data
21 type when at least one of the plurality of applications requests access to data in the
22 database.

1 21) (Original) The method of claim 20 further comprising the step of gathering the
2 statistics.

1 22) (Original) The method of claim 20 wherein the step of dynamically changing the
2 schema for the database comprises the step of changing the data type of at least one
3 column in the database.

1 23) (Original) The method of claim 20 wherein the step of dynamically changing the
2 schema for the database comprises the step of adding a new column of a second data type
3 to the database that contains the same data in an existing column of a first data type in the
4 database.

1 24) (Currently amended) A computer-implemented method for optimizing accesses to
2 a database comprising the steps of:

3 (1) reading statistics regarding the type of applications accessing data in the
4 database, the frequency with which the applications access the data, and the columns
5 being accessed by the applications;

6 (2) if the statistics indicate that a selected type of application has a number of
7 accesses to a selected column of a first data type in the database that exceeds a first
8 threshold level, performing the steps of:

9 (2A) if the statistics indicate that the selected type of application has a
10 number of accesses to the selected column that exceeds a second threshold level,
11 changing the data type of the selected column in the database;

12 (2B) if the statistics indicate that the selected type of application has a
13 number of accesses to the selected column that does not exceed a second
14 threshold level, adding a new column of a second data type to the database that
15 contains the same data in the selected column, the selected column and the new
16 column being defined as reflective columns because they contain the same data in
17 different data types.

1 25) (Original) The method of claim 24 wherein the first and second threshold levels
2 may be set by a human user via a user interface.

1 26) (Original) The method of claim 24 further comprising the step of maintaining
2 coherency of data in the selected column and the new column.

1 27) (Original) The method of claim 24 further comprising the step of gathering the
2 statistics.

1 28) (Original) The method of claim 24 further comprising the steps of:
2 (3) specifying a preferred data type for at least one of a plurality of applications
3 that access the database;
4 (4) detecting when one of the plurality of applications requests access to data in
5 the selected column;
6 (5) determining the preferred data type for the requesting application;
7 (6) determining if the data in the selected column is of the preferred data type for
8 the requesting application;
9 (7) if the data in the selected column is of the preferred data type for the
10 requesting application, returning the data in the selected column to the requesting
11 application;
12 (8) determining if the data in any column reflective of the selected column is of
13 the preferred data type for the requesting application;
14 (9) if the data in a reflective column is of the preferred data type for the requesting
15 application, returning the data from the reflective column to the requesting application;
16 (10) if the data in the selected column and in all reflective columns, if any, is not
17 of the preferred data type for the requesting application, performing the steps of:
18 (10A) converting the data to the preferred data type for the requesting
19 application; and
20 (10B) returning the converted data to the requesting application.

29-39) (Cancelled)

- 1 40) (Original) A program product comprising:
2 (A) a database optimizer comprising:
3 a data access mechanism that uses statistics regarding the type of
4 applications accessing data in a database, the frequency with which the
5 applications access the data, and the location of the data being accessed by the
6 applications to make at least one change to the database schema to optimize the
7 performance of accessing data in the database;
8 customization settings that may be set by a human user to determine the
9 function of the database optimizer;
10 a data coherency mechanism that maintains coherency of reflective
11 columns in the database that are created by the data access mechanism and that
12 contain the same data in different data types; and
13 a data type conversion mechanism that converts data in a first data type
14 retrieved from the database to a second data type that is preferred by the
15 requesting application; and
16 (B) computer-readable signal bearing media bearing the database optimizer.

- 1 41) (Original) The program product of claim 40 wherein the computer-readable
2 signal bearing media comprises recordable media.

- 1 42) (Original) The program product of claim 40 wherein the computer-readable
2 signal bearing media comprises transmission media.

1 43) (Original) A program product comprising:
2 (A) a database optimizer comprising:
3 a mechanism that reads statistics regarding the type of applications
4 accessing data in the database, the frequency with which the applications access
5 the data, and the columns being accessed by the applications;
6 if the statistics indicate that a selected type of application has a number of
7 accesses to a selected column of a first data type in the database that exceeds a
8 first threshold level, the database optimizer determines whether the statistics
9 indicate that the selected type of application has a number of accesses to the
10 selected column that exceeds a second threshold level, and if so, the database
11 optimizer changes the data type of the selected column in the database;
12 if the statistics indicate that a selected type of application has a number of
13 accesses to a selected column of a first data type in the database that exceeds a
14 first threshold level, the data optimizer determines whether the statistics indicate
15 that the selected type of application has a number of accesses to the selected
16 column that exceeds a second threshold level, and if not, the data optimizer adds a
17 new column of a second data type to the database that contains the same data in
18 the selected column, the selected column and the new column being defined as
19 reflective columns because they contain the same data in different data types;
20 wherein the data optimizer detects when one of the plurality of
21 applications requests access to data in the selected column, determines the
22 preferred data type for the requesting application, determines if the data in the
23 selected column is of the preferred data type for the requesting application, and if
24 the data in the selected column is of the preferred data type for the requesting
25 application, returning the data in the selected column to the requesting
26 application;

(claim 43 continued)

27 if the data in any column reflective of the selected column is of the
28 preferred data type for the requesting application, the database optimizer returns
29 the data from the reflective column to the requesting application;
30 if the data in the selected column and in all reflective columns, if any, is
31 not of the preferred data type for the requesting application, the database
32 optimizer converts the data to the preferred data type for the requesting
33 application, and returns the converted data to the requesting application; and
34 (B) computer-readable signal bearing media bearing the database optimizer.

1 44) (Original) The program product of claim 43 wherein the computer-readable
2 signal bearing media comprises recordable media.

1 45) (Original) The program product of claim 43 wherein the computer-readable
2 signal bearing media comprises transmission media.